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Animal and Plant Health Inspection Service  
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# Potato Cyst Nematode National Survey Plan:

## "Looking" To Keep Potato Markets Open





Figure 1—  
This is a  
microscope shot  
interior  
a juvenile



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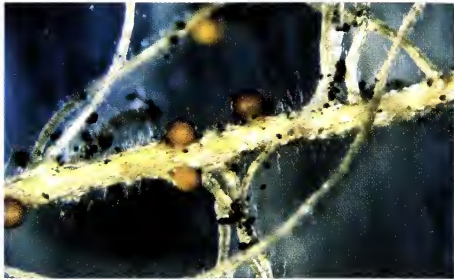
to early detection through surveillance, to prevent the establishment of foreign pests and diseases in the United States and protect American agriculture. Infestations of exotic pests such as the pale cyst nematode (*Globodera pallida*) and the golden nematode (*G. rostochiensis*) can permanently damage agricultural resources. Collectively, these pests are known as potato cyst nematodes (PCN). If PCN became established in the United States, their presence could eventually shut down potato exports to other countries.

Some plant pests, such as the Japanese beetle and Asian gypsy moth, leave almost immediate evidence of their presence. Others, like PCN, can go undetected for months or years—even decades—in the absence of vigilant surveillance. Early detection of pests provides optimal control opportunities, minimizes the use of pesticides, enhances product quality and marketability, and results in an abundant, readily available, and affordable supply of food, fiber, plants, and plant products for domestic and export markets.

Figure 2—  
A laboratory technician analyzes extracted soil samples, looking for evidence of PCN.



Figure 3—The orange balls are PCN cysts on a potato root.



## Background

A major pest of potato crops in cool areas, pale cyst nematode was detected for the first time in the United States in 2006 at a grader facility in eastern Idaho. After launching a rigorous survey, agriculture officials isolated the pest to just nine potato fields in southeastern Idaho. Golden nematode was first detected in 1941 in Long Island, New York (Nassau County). Since then, it has been confined to small areas within nine counties in that State. Together, PCN primarily affect plants within the potato family,



Figure 4—Here, potatoes move on a conveyor belt into a storage cellar.



including tomatoes, eggplants, and some weeds. If left uncontrolled, PCN can reduce yields up to 80 percent in potato fields.

PCN are soil-borne, microscopic worms that do not infest potato tubers. They infest feeder roots, where the females attach, feed, and become sedentary. Nematodes reproduce sexually. Males are attracted to females by a pheromone (sex attractant) and may mate several times. Females form cysts containing 200 to 600 eggs, which can stay dormant for up to 30 years while the eggs inside remain viable. Large numbers of the nematodes cause wilting, stunted growth, poor root development, and early plant death.

PCN originated in South America and are now widely distributed in many potato-growing regions throughout the world. In North America, the *G. pallida* and *G. rostochiensis* species of nematodes are also known to be present in Quebec, Alberta, and on the islands of Newfoundland and Vancouver in Canada.

## Detection

APHIS restricts the interstate movement of certain products from the designated regulated areas in Idaho and New York to prevent the spread of PCN. The following regulated articles are restricted:

- potatoes
- nursery stock
- soil, compost, humus, muck, peat, and decomposed manure
- grass sod
- small grains and soybeans
- hay, straw, fodder, and plant litter
- ear corn (except shucked)
- used farm and construction equipment
- any other articles deemed to present a hazard for spreading PCN

These articles can be moved outside of a quarantined area only when accompanied by a certificate or limited permit signed by a State or Federal inspector.



Figure 5—  
A survey specialist  
collects soil samples  
from a potato field  
during the PCN  
survey in 2006.

## National Survey Plan

Working closely with the potato industry, APHIS' Plant Protection and Quarantine (PPQ) program developed a multi-year, science-based National Survey Plan for the detection of PCN in all potato-producing States. The intent of the survey is to detect any potential problems early and gather information to demonstrate to trading partners that U.S. potatoes are PCN-free.

Seed potatoes pose the greatest risk (pathway) for PCN introduction and contamination from one field to another. Therefore, the survey in each State will first target seed potatoes and then commercial production fields. While the selection of production fields is designed to be random, the surveys will give particular attention to fields with a higher likelihood of infestation and detection. If a new detection of PCN occurs, APHIS and State officials will take regulatory actions to protect other potato fields and minimize the impact on the potato industry as a whole. In such an event, APHIS is committed to working with potato growers and State counterparts to develop reasonable and appropriate regulatory actions.



## Survey Methods

PCN infestations may be associated with patches of poor growth. Affected potato plants may exhibit yellowing, wilting, or death of foliage, but these symptoms are not always present. For example, in Idaho in 2006, pale cyst nematode was only detected by testing tare soil in a potato-storage facility as part of a survey through USDA's Cooperative Agricultural Pest Survey.

Pest survey specialists use full field surveys to collect soil samples for PCN testing. During a full field survey, each field must be sampled at a rate of one 5-pound sample per surveyed acre. All samples must be collected and sent to an approved laboratory for diagnostic testing. Each soil sample must be processed in its entirety in order to obtain accurate test results.



Figure 6—Mechanical wheel soil samplers like this one were used during the PCN survey in 2006.



## The Benefits of Participation

Participation in the survey is voluntary and is fully funded by USDA–APHIS. However, the benefits of the survey to the entire potato industry are likely to be directly related to the level of participation. In other words, more participation in the survey will generate more information to demonstrate that, other than the isolated PCN detections in Idaho and New York, this pest is not present in the United States. This information will help to improve the domestic and international marketability of the U.S. potato crop. Even if additional isolated cases of PCN are detected through the survey, APHIS and its State partners are prepared to localize and contain any potential problems and minimize the negative effects that may result. In this way, survey and early detection will better protect the U.S. potato industry from the serious consequences of allowing PCN to spread unchallenged or become established in the United States.

Background on PCN, the National Survey Plan, and other related materials are available online at [www.aphis.usda.gov/plant\\_health/plant\\_pest\\_info/index.shtml](http://www.aphis.usda.gov/plant_health/plant_pest_info/index.shtml).



Figure 7—Cleaning and sanitizing farm equipment is important in preventing the spread of PCN contamination to new locations.

Figure 8—  
Producers  
share  
information  
on best  
management  
practices for  
minimizing the  
spread of PCN.



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